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BEAVER

IN *Saskatchewan*

CONSERVATION BULLETIN No. 1

FOREWORD

This bulletin is the first of a series, the purpose of which is to describe the natural resources of Saskatchewan and outline sound methods for their management and utilization. The publications are intended to provide those people who are interested in natural resources with specific information of a semi-technical nature. The main consideration in preparing the material is to provide those who are, or may become, community leaders in conservation, with a sound basis for formulating opinions on this important subject.

Some of the bulletins will deal mainly with individual species; some with broader aspects of management and harvesting. In all cases they will attempt to convey some knowledge of the lives of plants and animals and their place in the vastly complicated web of nature, for such knowledge is essential to an understanding of conservation. Equally important is a conception of the place of man in the natural scheme of things. Adequate care of natural resources has become the most vitally important aspect of human existence on this increasingly crowded earth, and man may reap well-being only by sowing understanding.

SASKATCHEWAN
Department of Natural Resources
CONSERVATION INFORMATION SERVICE

HON. J. H. BROCKELBANK
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DEPUTY MINISTER

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INTRODUCTION

The beaver was largely responsible for the exploration and early development of Canada. The heroic exploits of the *coureurs de bois* of early French Canada, the chartering in 1670 of The Governor and Company of Adventurers of England Trading Into Hudson's Bay, and the tremendous voyages by canoe from Montreal far up the Mackenzie Valley in the 19th century, all were major facts in the history of Canada, and all were part and parcel of the trade in beaver skins. Testimony to the beaver's importance in the early economy of the nation is seen in the fact that from earliest times the beaver has been portrayed on stamps and coins.

The early trading hinterland included the area that is now Saskatchewan, all of which was within the natural range of the beaver, and very considerable areas of which were superb habitat. However, two and a half centuries of often ruthless exploitation were sufficient to destroy most of the original untold numbers, not only in the agricultural area but in the forests of the "northern half" of the province. The average harvest of pelts fell below the thousand mark several years running in the late 1930's and early 1940's, a fact which spelled poverty for the Indians and Metis of the forest area, most of whom depended on furs for most of their income and on beaver and muskrat flesh for a substantial portion of their meat supply.

With the inauguration of a federal-provincial fur conservation program in 1946 the beaver began to make a comeback and during recent years the harvest has achieved well beyond 50,000 pelts per annum. This amount of fur, even at the moderate prices recently prevailing, is a significant contribution to the provincial economy and a vital one to the economy of the northern native residents. Individuals, both in the farming country of the south and the forest country of the north, have had in the beaver an important source of supplementary income.

The fringe benefits of the beaver resurgence may prove on final analysis to be even more important than the market value of the pelts. In their hundreds of thousands the beaver play a role in forest fire control, soil building, watershed control and creation of favorable wildlife habitats which, though difficult to assess accurately in terms of money, is nonetheless extremely valuable.

The beaver management program has been one of the most obviously successful conservation projects so far instituted in this province, and may be considered a worthwhile example of what human beings can accomplish if they resolve to live harmoniously with nature rather than heedlessly attempt to exploit their natural resources.

The intention of this bulletin is: to describe the beaver and his effect on his environment, to tell briefly what steps have been taken in beaver conservation and what steps must still be taken, and to outline briefly the part played by trappers, the general public and professional conservationists in beaver management.

BEAVER DISTRIBUTION

A score of place names in Saskatchewan testify to the importance of the beaver to the early fur trader-explorer. Examples are: Beaver Creek near Saskatoon, the Beaver River north of the Meadow Lake-Green Lake area, the Beaver Hills, west of Yorkton, Lac la Ronge (Lake of the Beaver Chips), Beaverlodge on Lake Athabaska, Cut Beaver River in the Cumberland House area, and Amisk Lake southwest of Flin Flon, (Ahmisk being the Cree name for beaver). Beaver also figures in many local names throughout the province which, to avoid confusion, aren't used officially.

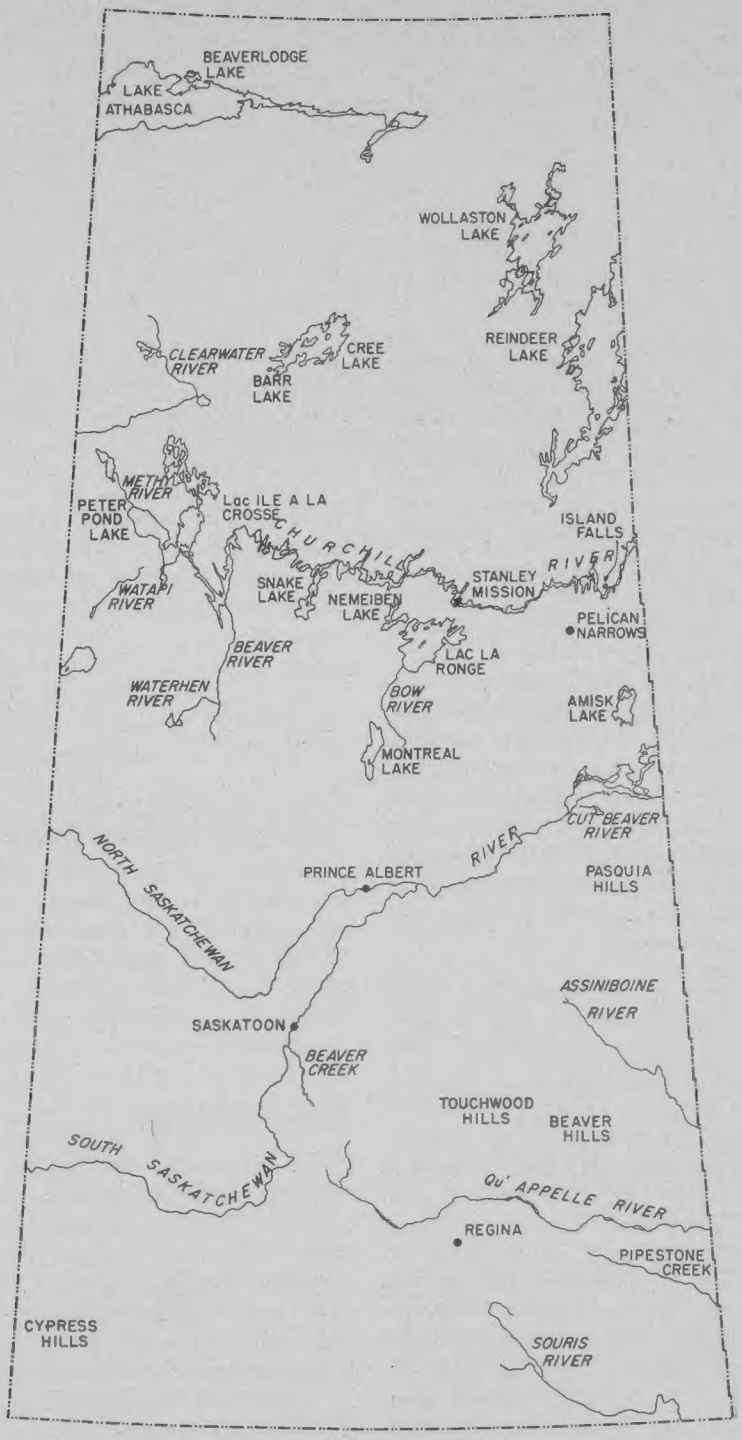
As implied by the wide distribution of beaver place names, the primitive population was distributed all across the province. However, certain types of habitat suit the beaver's way of life better than others, and the present population tends to be more or less concentrated in the better areas. Ideal beaver habitat is found where meandering or reasonably slow streams are easily dammed to provide shelter, and where a good supply of willow and alder, backed by heavy aspen poplar growth, provide food with a minimum of effort and danger from predators.

The Cypress Hills to the southwest are relatively heavily populated in valleys where there are adequate supplies of poplar. The major rivers of the province do not provide ideal habitat because of the ice hazard of early spring, though tributaries and backwaters provide valuable living space. The Qu'Appelle, lower Assiniboine, Souris and Pipestone Rivers are moderately well populated, but are unlikely ever to be heavy producers, due to the strict limitation on the amount of food produced. The valleys and lower slopes of the Touchwood Hills are reasonably suitable for beaver. The rivers of the Buffalo area—the Waterhen, Beaver, Watapi, Methy, Clearwater and a score of others with hundreds of tributaries, tend to be good producers with excellent future prospects. The meandering streams and muskeg ponds just north of the Churchill River system are excellent producers. The great Pre-Cambrian area beyond can never be exceptional due to the general sparseness of timber, especially aspen poplar. The Pasquia Hills area has too turbulent streams and too high a proportion of spruce to be good beaver habitat. The top producers at present are the Pelican Narrows and Stanley areas, and the area between Snake (Pinehouse) Lake and Lac la Ronge.

LIFE HISTORY

The general appearance of the beaver is familiar to all Canadians, since he is one of the national emblems. His general habits are also well enough known, and are such that he is commonly held up to the youth of the nation as an excellent example of industry, ingenuity and perseverence.

Some of the more scientific data are less well known. For example, the beaver is a rodent, the biggest rodent native to North America. There are two recognized species on the North American Continent—*Castor Canadensis (Kuhl)* and *Castor caecator (Bangs).* Of the 12 sub-species or races of *Castor Canadensis,* only one, *Castor Canadensis Canadensis (Kuhl),* is native to Saskatchewan. There isn't much difference either in appearance or habits among the different species and sub-species.



SASKATCHEWAN

Beaver commonly weigh 60 pounds or more and occasionally, in the case of fat old bucks, have been recorded near the 100-pound mark. The average total length for mature beaver is 40 to 45 inches. The tail may be 16 inches long and four or four and a half inches broad. The biggest pelts are called blanket beaver by the fur trade, and their length plus breadth must total 69½ inches.

The front paws function efficiently as hands and are used to handle and hold branches, twigs, mud or stones when building dams or lodges. The hind feet are seven or eight inches long and are webbed, providing the beaver with a very efficient means of propulsion for swimming either on the surface or underwater. The tail is used as a rudder in swimming, an aid to diving, a prop when the beaver is sitting up to cut a tree, and as a signalling device. The beaver slaps the water with his tail as he dives, making a sharp sound like the report of a small rifle which warns the other beaver of danger. There is no truth in the oft-repeated tale that the beaver uses his tail as a trowel, or as a hod for carrying mud for dam and lodge construction.

The teeth of the beaver are deep orange in color and the long, powerful incisors are hollow-ground, self-sharpening and capable of cutting and tearing a chip half as large as a man's hand from the bole of a big poplar. These long incisors keep growing throughout the life of the beaver, and must be used constantly or they will grow until they form circles three or four inches in diameter, and as the teeth grow, their points will sometimes penetrate the skull from behind, killing the beaver. Trees as large as 42 inches in diameter have been felled by beaver, but the average runs from three to eight inches. The beaver can close his lips behind the large incisors, and so is able to gnaw twigs and logs under water.

The number of young, called kits, runs as high as seven or eight per litter, but averages about four. They are usually born in June. The young beaver stay in the home lodge until they are more than a year old, and then may find mates and build their own dams and lodges, producing young the following June. Beaver are usually considered to be fairly monogamous, but polygamy is by no means exceptional.

The most desirable beaver food is white poplar, (quaking aspen, *Populus tremuloides,*) of which only the bark and small twigs are eaten. Black poplar, though less desirable, is also eaten. Willow and alder form the best supplementary diet, and various water plants, such as water lily roots, are consumed in usually limited quantities. Under circumstances where poplar is not available, as in parts of the Qu'Appelle Valley, beaver still manage to exist, probably having adapted themselves to alder, elm, maple and the suitable aquatic forage available, such as cattail and rush roots and roots dug up on dry land. Trails running to adjacent wheatfields indicate that the beaver diet is adaptable to some cultivated crops.

ENGINEERING

As an engineer the beaver exceeds even the abilities popularly attributed to him. The beaver dam is usually made of green poplar poles and branches stripped of their nutritious bark and weighted down and bound with mud and moss. When completed it constitutes a formidable earthwork so completely reinforced and cross-stressed that most of man's concrete-cored, tamped, ballasted, riprapped

earth dams are weak and unsubstantial by comparison. On more than one occasion in Saskatchewan, concrete dams built by engineers for water conservation and beaver or muskrat stocking programs have cracked and been partly washed out by spring floods, but have been repaired by beaver in such a workmanlike fashion that they stood up indefinitely thereafter.

Naturalist Ernest Thompson Seton says that 100 to 200 tons of material may be used in a large dam. Seton also specifies a length of 700 feet as the longest ever recorded. However, if the definition of "dam" may be expanded to include levees and dykes extending as wings from the main body of the dam, at least one dam in this province exceeds Seton's by roughly 4,500 feet. On the upper Bow River east of Montreal Lake a 10-foot high dam blocks the rather narrow river channel, and an irregular set of wings varying from a few inches to a few feet in height create a half-circle holding back a pond 25 to 30 acres in extent. The total length of the dam and wings is approximately a mile. The architects and engineers of this project appear to have been three or four colonies of beaver—that being the number of lodges in the pond.

When extremely high dams are built, which will be subjected to water pressure even beyond the capacity of a beaver dam to withstand, the beaver resorts to an engineering trick that is almost unbelievably complicated in relation to the reasoning processes of a so-called "dumb animal". A short distance below the main dam the beaver build a smaller dam which backs water up against the downstream side of the main dam, thus neutralizing some of the pressure created by the high head of water on the upstream side. Occasionally, the second dam is backed by yet another, and the three together constitute one of the engineering marvels of nature.

Beaver houses — usually called lodges—may be dug out of the banks of lakes, streams or ponds, or they may be constructed of wood, mud and stones in the beaver pond. Wherever soil depth permits, bank lodges are the more common. Lodges are massive affairs, averaging about 15 feet wide

Beaver Dam in the Cypress Hills.

by six feet high at water level. The pile of wood and mud covering a bank lodge will have about the same dimensions. A few lodges have been found measuring as much as 24 feet wide at the base and 10 feet high. Usually a lodge is occupied by a single family, which may consist of the adults, the kits of the current year and the yearlings born the previous year.

The usual lodge has two or three chambers above water level, all of which are joined together by tunnels. A feed runway goes down from one of the chambers and emerges from the bank or lodge foundation under water —always deep enough that ice will not freeze up the tunnel mouth even in the coldest winter. Some lodges have more than one such self-contained apartment, and Samuel Hearne in his *Journey to the Northern Ocean,* mentions lodges with as many as a dozen apartments. Most colonies have one or more bank runs, which are simply tunnels dug from an underwater point into the bank. Some bank runs are 20 or 30 feet long.

The beaver takes advantage of the fact that water transportation requires less energy than land transportation—hence he builds canals from his pond in the direction of his food supply, usually a grove of poplar. Seton mentions one such canal on the Musselshell River in Montana that was 1,145 feet long. On the Bow River in Saskatchewan a canal extends approximately 900 feet from the beaver pond, and averages about three feet wide and up to three feet deep.

A Big Lodge in the Northern Forest.

During their usual September and October rush to lay in a food supply, the beaver fell the trees closest to the pond or canal, limb and "buck" them into short lengths, float them to a point in the pond near the lodge, and sink them to form a food-pile on the bottom of the pond where they will not freeze into the ice in winter. During the winter the logs can be pulled into the lodge one by one—a succulent food supply obtainable without exposure to frost or hungry predators.

Some colonies have to make a long haul to get food to their pantry. On one stream south of Lac la Ronge the beaver have "logged off" the low-lying muskeg area near their pond, have dug a 50-foot canal to the edge of a burned area, cut a 200-foot "tote-road" through the deadfalls of a burn and then travelled up a hillside through perhaps 100 yards of green spruce and jackpine to begin logging operations in the poplar and birch grove on the hilltop. While canals are very common, such a logging operation as this is most uncommon, since a great deal of work is entailed and the beaver is not, in spite of legend to the contrary, more industrious than he has to be to survive. One other reason is that the beaver, clumsy and slow on land, would be uncomfortably exposed to attack by wolves, lynx, bears, coyotes and other predators. Such an operation probably indicates over-population in relation to food supply.

Beaver Ponds Provide a Suitable Environment for Many Wildlife Species. Exam
Skunk, Mallard Ducks, Bittern, Muskrat, Northern Pike,

es. Examples above are: Red-winged Blackbird, Mink, Family of Goldeneye Ducks,
ern Pike, Hawk, Deer, Kingfisher and Moose.

RELATIONSHIP TO ENVIRONMENT

The beaver, more than most animals, affects his environment. Series of dams on most of the tributaries of a large river can noticeably slow down the spring run-off, cutting down the tremendous floods which kill fish, damage wildlife, create erosion problems, wash out bridges and grades, and generally create havoc. Beaver ponds damage a certain amount of timber by flooding it out, but on the other hand serve as reservoirs of water for fire fighting. A series of ponds may create a very effective base for a fire line.

Beaver ponds also provide other mammals and birds with drinking water supplies during drouth periods, and are used by many species as a habitat. There are usually a couple of muskrat houses in each beaver pond, and probably a hatch of ducks, a number of fish species and various wading birds and small aquatic animal life. A whole bird and animal group may grow up around a pond; songbirds that need an opening in the bush and a supply of water insects; hawks and owls that find part of their food supply among the small mammals and birds near the pond; kingfishers that feed on small fish; tree nesting ducks that thrive in such a combination of water and timber; skunks who wander around the edges of the ponds seeking insects and snails or perhaps the odd egg or young duckling. Thus in one way or another, a beaver pond may affect nearly every species of wildlife in the vicinity.

In addition to water-killing a certain amount of timber, the beaver uses a considerable amount for food. In Michigan it has been estimated that seven beaver consume an acre of good aspen poplar growth per year. The figure may be slightly higher in Saskatchewan, where winters are longer and more severe. Three colonies in a pond might require two acres per year, which means that in some areas, at least, depletion will be greater than new growth, and the beavers will have to migrate to a new area. When this happens, the dam eventually washes out, the pond drains away and the accumulated silt and humus of ten or twenty years remains to form a rich glade in the forest which provides grass and browse for big game and space required by certain species of birds and mammals, eventually growing up to forest again. Over the centuries beaver meadows create thousands of rich pockets of soil on the bare Pre-Cambrian rock of the Shield, and the glacial till soils south of the Shield are enriched and made more productive.

Dam building in the farming and ranching area of the province can be less beneficial than in the forest area. Beaver inevitably stray out of the heavily wooded, hilly country and down along streams that run through the rangeland, haylands and farm land. Sometimes their dams provide reservoirs of water that are useful for stock or to maintain a high water table in a local area, but during the recent years of high precipitation, flooding and damage to hay and crops have been fairly common.

Present policy is that farmers and ranchers who suffer from beaver damage are entitled under permit to remove these "nuisance beavers" by any means they choose, and to destroy dams on property under their control. However, people who are troubled by these strays of the beaver tribe should remember, before destroying them, that on the long average, drouth has been more harmful to farming and ranching in Saskatchewan than has a

Logging Operations by Beaver in Aspen Poplar Stand.

surplus of water. If, even in consideration of this, it still seems desirable to destroy the intruding beaver, this should be done at a time when the fur is prime and will bring in a worthwhile amount of money.

MANAGEMENT

The word "management" is a relatively new one as applied to natural resources. Most people are in the habit of considering the absence or plenty of wildlife as something in the nature of an act of Providence, not as something over which there may be any positive control. For example, a farmer or rancher is properly shocked when he sees land overgrazed, because he knows that in the long run too much livestock is disastrous to the range and actually means lower average production than when the range is moderately grazed. But the same farmer or rancher may be slow to see that a liberal harvest of deer may sometimes be equally necessary to cut the population down to a point where the natural range of the deer will not be woefully overbrowsed, with subsequent hardship, starvation and low population. A poultryman may be fully aware that crowded conditions make his flocks unthrifty and susceptible to disease, but he may not realize that wildfowl may suffer equally from overcrowding, even though to the unpracticed eye the population may not seem very high at all.

These examples provide a hint of the significance of the word "management" in relation to wildlife. Conservation, or management, of wildlife usually means far more than blind protection. However, during the first

six or seven years following the inception of the fur conservation program in Saskatchewan in 1946, management of the beaver consisted mainly of a program of protection through rigidly limiting the harvest and of transplanting "seed" beaver into good beaver areas.

Beaver were live-trapped in areas like the Cypress Hills where a few still remained, and released at strategic points throughout the province, even being carried by plane to northern points such as the area around Lac Ile a la Crosse, the Pasquia Hills and the Churchill River. It was said at that time that Indian children fifteen or sixteen years old had never in their lives seen a live beaver, in the area that a century ago was famous for its peltries. During the transplanting program, about 2,600 beaver were live-trapped, transported and released.

Even before the transplanting program got underway, it was necessary to take positive measures to ensure that the harvest would be limited to a small percentage of the annual increase in order that the beaver might quickly establish themselves in large numbers over a wide area. To this end, two main measures were felt to be essential. The first step was legislation prohibiting the sale of Saskatchewan-caught beaver (or muskrat) except through a fur marketing service established by the Saskatchewan government. The intent behind this regulation was to discourage poaching and bootlegging and to ensure that the trappers received the highest available market price for their product. The second main measure consisted of limiting the take of beaver to one per lodge each year after the trapper had five occupied lodges on his trapline. This latter regulation applied in the north only.

The "compulsory marketing" legislation alone, plus normal supervision of trapping, was considered sufficient to ensure the comeback of the beaver in the southern, agricultural area. In the great 150,000 square mile wilderness area, however, such measures would almost certainly have proved inadequate. Unlike the people of the agricultural area, most of the northern residents depended very largely on fur for their living. Secondly, in contrast to the almost universal literacy of the south, northern residents were for the most part unable to read or write well in English, being mainly of Indian stock. Regulations limiting the take of beaver simply could not be enforced over such a vast and rugged territory *unless the inhabitants themselves were fully convinced that the regulations were desirable.*

These facts being understood, the subsequent measure was to divide the whole wilderness area into 96 Conservation Areas. In each such area a Trapping Council was formed, consisting of five trappers elected by the other trappers of the area. It was established as a necessary part of the program that the beaver (and muskrats) in each Conservation Area would be trapped on a quota basis, each trapper receiving his fair share. As a precaution against the possibility of poaching by non-residents, the Councillors were made Deputy Game Guardians. A number of Game Management Officers were placed in the field to do research and to spot-check the censuses turned in by trappers, and to provide coaching in trapping techniques and methods of skinning and preparing pelts for market.

The fur conservation measures in the north were undertaken jointly by the federal and provincial governments. Federal participation in pro-

Live-trapping Beaver in the Cypress Hills.

vincial conservation programs dates back to work done in 1936 in the Delta area of Manitoba, and since then has occurred in most provinces, Saskatchewan becoming a participant in 1946.

While the provincial government is responsible for supervising natural resources, the federal government is responsible for the welfare of the treaty Indians, and thus has a direct interest in ensuring that there will be adequate supplies of fur-bearing animals. In the main, provincial Natural Resources Department personnel have carried out the practical aspects of the program, with the federal government providing financial assistance and the advice and participation of several members of the federal Indian Affairs Branch, one of whom is a member of the three-man Fur Advisory Board which recommends policy for Saskatchewan as regards the northern fur conservation program.

The Trapping Councillors' sense of responsibility with regard to protection, together with the community's feeling of proprietorship and the assurance that the program would eventually pay off financially, were doubtless important factors in the success of the program, and a very important additional factor was the annual Trappers' Convention, held in Prince Albert in January of each year. At the Convention, the representatives of the trappers were able to meet as a body with federal and provincial game and fur officials to present their recommendations, problems or complaints. For the first time in the lives of most of the Indian, Metis, and white trappers, they had the opportunity of asking the *Okimaw* of the government to account for and explain the laws gov-

erning the resources from which they derived their livelihood. For the first time, they were able, by their vote to directly influence some of these regulations. While beaver and muskrat conservation was the basic topic at the conventions, other questions related to game and fur inevitably came up for discussion, and were given merited consideration. After all, the willing participation of the trappers in beaver and muskrat conservation would hinge to some extent on whether, for example, they might take a moose for food, or whether the beaver trapping quota would be increased from one to two beaver per lodge as soon as the increase of population justified such a step.

In summary, the three main factors contributing to the success of the fur conservation program in the north were: spontaneous democratic participation by the trappers, the willingness of the administrators to recognize that the conservation problem was intimately connected with the social and financial problems of the trappers, and finally, the legal "teeth" provided by the compulsory marketing legislation. A further important factor was that as beaver and muskrat began to provide increasing income, trapping pressure on upland fur decreased, permitting a significant increase of these furbearers and a proportionate increase in income from this source, which in turn decreased any possible temptation to insist on overtrapping beaver and rats.

Under such conditions the beaver thrived in the north, and increased also in the southern part of the province wherever habitat was favorable. In most Conservation Areas of the north it had become possible by 1952 to raise the quota to two or even three beaver per lodge. In the south, the 10-year licence was replaced by a system of permits which considerably increased the number of beaver trappers, and in the 1954-55 season permission to take beaver was automatically included with the furbearers covered by the ordinary South Saskatchewan trappers' licence, thus allowing licence holders practically free trapping of beaver subject to the consent of landowners.

With fur population booming in the north, a majority of the trappers finally decided that "compulsory marketing" of beaver and muskrat was no longer an essential part of the conservation program, and at the 1954-55 Trappers' Convention passed a resolution against it. The legislation was accordingly changed to permit the sale of beaver and muskrat to any licenced dealer, as well as to the government marketing service.

With the vast increase in beaver populations, management has now ceased to be mainly a matter of protection. In certain areas at least it has now become important to ensure that an adequate harvest is taken. Too high a beaver population in a given area is actually worse from a management standpoint than is a population below the carrying capacity of the area.

What can happen when the population becomes too high? The answer is that a variety of calamities can strike, together or separately, and that damage can be done not only to the beaver population itself, but to the countryside. Examples are provided by areas in the eastern Rocky Mountain watershed of the United States.

In some areas beaver were protected to the ultimate. No trapping was allowed, and all the predators which kill beaver, such as lynx, coyotes, bobcat, cougar and bear, were hunted almost to extermination.

The result of such protection was that the beaver population boomed, thriving mightily u n d e r conditions which were never duplicated even in the great beaver days before the white man came. The foothills streams were dammed along their length, beautiful beaver ponds made the countryside a veritable paradise for other forms of wildlife and for humans as well; spring floods were reduced and fire hazards declined; in short, the program of beaver protection had apparently in a few short years turned the foothills into a splendid natural garden where all forms of "beneficial" wildlife thrived and all the "harmful" predators were reduced to a minimum. So it seemed at least, but Nature had a cruel trick in store for those who tried to deny her law that the creatures of the wild must kill and be killed.

The beaver population rose from almost n i l to fairly considerable numbers, then it boomed, rising to a point that delighted the protectors. Then came a tragic lesson. Animals like the beaver, who live a long time —say 8 or 9 years—and who have litters averaging 3 or 4 kits, and who are faced with no enemies, can double their population every year, creating, by a geometric progression, a vast eruption of population. This is what happend in the American foothills area. An "ideal" population one year became two or three times too big the following year, and the year after that the situation was out of hand completely. The teeming beaver, desperate for food, stripped the hillsides bare of every tree and shrub, killed every edible water or earth-growing plant available, and finally disappeared. The following spring the snow melted rapidly, with no shade from trees or shrubs to slow the process down; meltwater rushed down the naked hillsides, gouging gullies as it went, silted up or washed out the multitude of untended dams and raced down to fill the rivers brimful and more with dirty, wild water. The hillsides entered the summer arid of water and barren of shelter, and by fall were deserts, with no life in them. Just a couple of summers of heedless overprotection had turned the gentle, beneficent, useful beaver population into a starving mob capable of making a paradise into a desert in a few short months.

Whereas most of the topography of Saskatchewan is too gentle to permit such a violent catastrophe here, overpopulation could flood or denude large areas and create widespread starvation. General desertion of dams over a large area can create a tract of waterless grass-grown country, littered with deadfall trees—a critical forest fire hazard.

Disease too can wipe out beaver populations. Tularemia, an infectious disease, is one of the main epidemic diseases of beaver. When a large population is crowded into a limited area, it can rage through the lodges leaving only rotting carcasses in its wake.

Is Saskatchewan in any great danger from these results of overcrowding? The answer is, "Yes, in some areas at least." There are isolated areas where too little trapping is done, and in these pockets there is some danger of disease and possibly of starvation. There are some areas, such as the many-times burned-over area north of Snake (Pinehouse) Lake, where the remnant of soil has been sufficient only to support birch, with a scattering of willow and aspen recently appearing. Even in this inhospitable area, beaver were by 1952 appearing in increasing numbers, due to pressure from crowded adjacent areas.

They build their lodges mainly of dry, used or rotten wood using a high proportion of moss, mud and stones. They subsist with difficulty on birch bark, willow, water plant roots and the small amount of aspen available, and in some localities require such an extensive feeding range that a single family may require two or three lodges. If the beaver in these areas are to be turned to profitable account, and no mass die-offs are to occur, fairly vigorous trapping must be stimulated.

A variation of this situation is to be found along the Churchill River. The Churchill runs through rocky Pre-Cambrian Shield—an area that is not normally the best beaver country. At the present time, however, the tributaries, headwaters and backwaters of the Churchill are supporting the greatest concentration of beaver in the province—practically all the way from Barr and Nemeiben Lakes east to Lac la Ronge and further still almost to Island Falls.

The reason for the high population is that much of this area was burned several decades ago and is now supporting a tremendous growth of maturing poplar—a vast food supply for beaver. Under this stimulus the population has risen tremendously. However, a forecast of the beaver's gradual future decline along the Churchill is visible in the same poplar forests that now nourish them. Coniferous trees, mostly spruce, are even now rising among the aging poplar to reach the sun. A decade or two, or three at the most, will likely see most of the Churchill watershed grown up solidly to spruce—a fit habitat for only the red squirrel, spruce hen, marten, fisher and the odd big game animal. Thus the beaver is most likely to gradually decrease and eventually almost disappear in this area—a factor which deserves consideration when trapping quotas are being set during the coming years. As in any other area where beaver population is higher than the habitat can support, management will become largely a problem of harvesting rather than protecting.

THE FUTURE

In looking at the over-all picture of the beaver in Saskatchewan we see a tremendously successful program of protection already accomplished, and we see that the program could not possibly have been carried out without the informed support of the general public, especially those whose livelihood depends in part on fur. We also see the possibility of further management problems developing, mainly in connection with the promotion of adequate harvesting. It is logical to suppose that the public, especially those who trap, will not wilfully risk a return to the situation that could result from heavy overpopulation followed by a great "crash" due to starvation and disease. However, the management program of the future will be largely dependent on public understanding of the principles involved, and public support of measures that may be adopted to meet the problems before they become acute.

The regulations governing the taking of beaver have been relaxing steadily as the population increases to the point where a high harvest is desirable in most of the north and essential in parts of the agricultural area which might be affected by "nuisance beaver". In order to achieve adequate management of beaver, it is desirable that there should be a considerable body of part-time non-professional trappers in the province, and professional trappers must be encouraged to trap as much as is necessary to keep the populations stable.

CONCLUSION

The status of the beaver as a fur bearer has, during the past couple of decades, passed rapidly through four distinct phases. During the first phase, the original population was reduced by over-trapping almost to extinction in most areas. During the second phase, "hard-up" trappers maintained such heavy trapping pressure on the remnants that there was no possibility of a comeback. During the third phase, a combination of legislation, public co-operation and biological research gave the beaver an opportunity for a spectacular increase. During the fourth or present phase, attention is being paid to the possibility that strong measures may be required to ensure that enough trapping is done to keep the population from increasing past the danger point. During the whole of the conservation program, a considerable number of human and natural factors had to be kept constantly in mind, and a variety of theories were put to practical test in the field.

On the whole, success was achieved, but in the field of game management, success is not necessarily durable. Market conditions and the prosperity or poverty of trappers are among the variables that affect management. Nature herself is never stable and passive, and the "balance of nature" is a myth. There may be times when a balance appears to have been achieved, and it seems that all species are killing and being killed in exactly right proportions. However, some area of stress is bound to appear sooner or later, and the apparently Utopian harmony of nature may be rudely shattered by great eruptions of population and catastrophic die-offs. In order to achieve continuing success, there must be a continuation of scientific studies so that trouble spots may be foreseen before they become serious. There must also be continuing flexibility in management policies, and in order that this may be achieved, there must be general public understanding of the principles of conservation.

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Above: Indian Woman Fleshing Stretched Beaver Pelts.

Below: A Good-sized Beaver Canal.